**-Forensic Archaeology-**

Determining the time when a crime occurred is vital to the criminal investigation. Archaeologists are often used to assist crime scene investigators when a crime occurred in the past.

**Detectives of the Past:**

Field archaeologists are often called “detectives of the past.” They use their skills to help unearth evidence, remove it from the ground, and interpret the clues they find. A field archaeologist uses his or her skills to reconstruct the past.

Archaeologists can work with chemists to determine such things as the sex and age of skeletal remains, diseased the victim had suffered in the past, age of the victim at death, and the age of the skeletal remains. This information can then be compared to missing person records from long ago to help determine the identity of human remains.

**Dating Skeletons:**

Usually, scientists try to determine the age of human skeletal remains. One method used to date the age of the skeletal remains is the Carbon 14 method. Carbon is an element found in all living things. Carbon 14 is an isotope of carbon. Isotopes are atoms with the same number of protons, but different numbers of neutrons.

Carbon 14 dating can be used to find the ages of once living things because all organisms absorb Carbon 14 when they are alive. Once an organism dies, its body begins to lose Carbon 14 at a fixed rate. Scientists can measure the amount of Carbon 14 remaining in a skeleton to determine the date the person died.

Forensic scientists and archaeologists often form teams to help identify missing persons. They work with complete skeletal remains or small quantities of remains such as bone and tooth fragments. Archaeologists have even been called in to help solve the mystery of individuals murdered in war crimes of the past.

*Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

**Dating the Dead**

***Crime Investigation Details:***

At the beginning of the year (2010), a local man was walking his dog deep in the woods in Foster, RI. The man reported that the dog suddenly sprinted towards suspicious-looking mound o f dirt. The man immediately called the local authorities to evaluate the scene.

After careful investigation, the CSI team immediately asked field archaeologists to visit the site as they suspected the mound to be a grave. The site was carefully excavated and skeletal remains of a human were found in the grave.

The skeletal remains suggest that foul play may have been involved as there is a bullet wound to the skull. Archeologists and Forensic scientists determined that the remains belong to a female, approximate age 13. The gunshot wound was inflicted at close range through the back of the head.

Police records reveal a list of missing girls who are approximately age 13. The missing person records came up with 10 plausible matches. Archaeologists decide to narrow down the range of possibilities by determining how long the young girl has been dead. They will need your help to do this. You must use *Radioactive Dating.*

**Missing Person Report**

|  |  |  |
| --- | --- | --- |
| ***Name of Girl*** | ***Hometown*** | ***Date first reported missing*** |
| Sue Crayton | Haverhill, MA | 1974 |
| Brenda Spelling | Miami, FL | 1997 |
| Jane Danson | Bar Harbor, ME | 1957 |
| Julie Mcintyre | Bristol, RI | 1947 |
| Tessa Sparks | Atlanta, GE | 2002 |
| Melissa Gallant | Charlotte, NC | 1946 |
| Theresa Young | Sharon, MA | 1997 |
| Toni Colonna | Ocean City, MD | 1912 |
| Jenny Walsh | Syracuse, NY | 2007 |
| Victoria Andrews | North Kingstown, RI | 1932 |

**Procedures:**

1. Count the total atoms in the box and record this number in the data table

2. Shake the box from side to side to mix your atoms. Dump the atoms on the desk in front of you.

3. Remove all of the atoms that land with the red side up. These atoms have decayed during the first half life (10 years).

4. Count the number of atoms you removed. Record this number in the proper location on the Data Table. Subtract from the beginning number to find the number of atoms remaining after half life 1 (10 years)

5. Repeat steps 2-4 with the atoms remaining in the box. Record your findings in the Data Table. This will be the number of atoms decayed and the number that remain after the second half life of ten more years. The total decay period now will be 20 years.

***Hint:*** *Remember to subtract the number of the atoms that remain from 567 each tie to get the number of atoms that decayed. Each two numbers should add to 567 each time.*

6. Repeat the above steps four more times so you will have covered 60 years. Record your findings each time.

7. Use your data to make a line graph. The horizontal axis represents time in years. The vertical axis represents the number of atoms of the radioactive element that remains. (Be sure to label graph)

**DATA TABLE** *(20 pts)*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | ***Start*** | ***Half-life 1***  ***after***  ***10 years*** | ***Half-life 2***  ***After***  ***20 years*** | ***Half-life 3***  ***after***  ***30 years*** | ***Half-life 4***  ***After***  ***40 years*** | ***Half-life 5***  ***After***  ***50 years*** | ***Half-life 6***  ***after***  ***60 years*** |
| **Number of atoms that have decayed** | 0 |  |  |  |  |  |  |
| **Number of atoms that remain in sample** | 567 |  |  |  |  |  |  |

**\*New Evidence Update:**

Results gathered by the forensic report states that as of today’s date, the skeletal remains have lost 90% of their radioactive atoms to decay.

**Post Lab Questions** (10 pts each) **& Graph Attached** (20 pts)

1. Based on your analysis, the skeletal remains found in the grave most likely belong to which missing person?
2. Explain how you arrived at this conclusion using the Data collected.
3. Use your graph to determine how many of the 567 atoms would remain in the sample after about 5 years?
4. How many atoms would you expect to remain in the sample after 55 years?
5. Was it important to know how many atoms there were in the sample at the start of the experiment? Explain your reason?
6. Describe how an archaeologist can help forensic scientists date past crimes.